

**Approved Final**

**Peer Review Plan to Support the  
Programmatic Environmental Impact Statement for Evaluating  
Oyster Restoration Alternatives for the Chesapeake Bay,  
Including the Use of Native and Nonnative Oysters**

**AUTHORIZATION:** The Norfolk District received the authority to pursue this project under Section 510 of WRDA of 1996, as amended by Title 1, Department of Defense - Civil, Department of the Army, Corps of Engineers - Civil, Construction General provisions of the Energy and Water Appropriations Act making appropriations for Fiscal Year ending September 30, 2004. The resolution reads:

*"That using \$200,000 appropriated herein, the Secretary of the Army, acting through the Chief of Engineers, may develop an environmental impact statement for introducing non-native oyster species into the Chesapeake Bay: Provided further, That during preparation of the environmental impact statement, the Secretary may establish a scientific advisory body consisting of the Virginia Institute of Marine Science, the University of Maryland, and other appropriate research institutions to review the sufficiency of the environmental impact statement: Provided further, That in addition, the Secretary shall give consideration to the findings and recommendations of the National Academy of Sciences report on the introduction of non-native species into the Chesapeake Bay in preparation of the environmental impact statement: Provided further, that notwithstanding the cost sharing provisions of this section, 510(d) of the Water Resources Development Act of 1996 (110 Stat. 3760), the preparation of the environmental impact statement shall be cost shared 50 percent Federal and 50 percent non-Federal, for an estimated cost of \$2,000,000: Provided further, That the non-Federal sponsors may meet their 50 percent matching cost share through in-kind services: Provided further, That the Secretary determines that the work performed by the non-Federal sponsor is reasonable, allowable, allocable, and integral to the development of the environmental impact statement".*

The United States Congress, pursuant to Conference Report 108-792 in the Consolidated Appropriations Act of 2005 (Public Law 108-447), has authorized the Corps of Engineers:

*"Within the funds provided, \$400,000 (\$600,000) is provided to continue environmental studies of non-native oysters. The conferees expect the Corps, in conducting the Environmental Impact Statement [EIS] for introducing non-native oyster species*

*into the Chesapeake Bay, to consider all alternatives, including restoration of native oyster species. The conferees also expect that the EIS will address the research gaps identified in the National Research Council report entitled "Non-native Oysters in the Chesapeake Bay" and the Chesapeake Bay Scientific and Technical Advisory Committee report on the same subject".*

**NOTICE OF INTENT:** On January 5, 2004, the Army Corps of Engineers issued a Notice of Intent (NOI) to prepare a Programmatic Environmental Impact Statement (EIS) for a Proposed Introduction of the Oyster Species, *Crassostrea ariakensis*, Into the Tidal Waters of Maryland and Virginia to Establish a Naturalized, Reproducing, and Self-Sustaining Population of This Oyster Species.

The NOI established the Corps as the lead Federal agency, and the Virginia Marine Resources Commission (VMRC) on behalf of the Commonwealth of Virginia and the Maryland Department of Natural Resources (MDNR) on behalf of the State of Maryland as the lead state agencies (States). The U.S. Environmental Protection Agency (EPA), the National Oceanographic and Atmospheric Administration (NOAA), and the U.S. Fish and Wildlife Service (FWS) were designated as the Federal cooperating agencies.

**PROJECT PURPOSE AND NEED:** The purpose of this EIS is to identify a preferred oyster restoration alternative(s) for establishing an oyster population that reaches a level of abundance in Chesapeake Bay that would support sustainable harvests comparable to harvest levels during the period 1920-1970.

A need exists to restore the ecological role of oysters in the Bay and the economic benefits of a commercial fishery through native oyster restoration and/or an ecologically compatible non-native oyster species that would restore these lost functions.

**STATES' PROPOSED ACTION:** The State of Maryland and Commonwealth of Virginia propose to introduce the oyster species, *C. ariakensis*, into the tidal waters of Maryland and Virginia, beginning in 2005 or as soon as a rigorous, scientifically based EIS can be undertaken and a Record of Decision prepared, for the purpose of establishing a naturalized, reproducing, and self-sustaining population of this oyster species.

Diploid *C. ariakensis* would be propagated from existing 3rd or later generation of the Oregon stock of this species, in accordance with the International Council for the Exploration of the Sea's (ICES) 2004 (2003) Code of Practices on the Introductions and Transfers of Marine Organisms.

Deployment of diploid *C. ariakensis* from hatcheries is proposed to occur first on State designated sanctuaries separate from native oyster restoration projects, where harvesting would be prohibited permanently, and then on harvest reserve and special management areas where only selective harvesting would be allowed.

The States further propose to continue native oyster (*Crassostrea virginica*) restoration efforts with the Corps throughout the Chesapeake Bay by using the best available restoration strategies and stock assessment techniques, including the maintenance and expansion of the existing network of sanctuaries and harvest reserves, enhancing reproduction through broodstock enhancement, and supplementing natural recruitment of this species with hatchery produced spat.

**ALTERNATIVE ACTIONS:** The following alternatives to the proposed action will be evaluated in the EIS:

Alternative 1 - No Action - Not taking the proposed action: Continue Maryland's present Oyster Restoration and Repletion Programs, and Virginia's Oyster Restoration Program under current program and resource management policies and available funding using the best available restoration strategies and stock assessment techniques.

Alternative 2 - Expand Native Oyster Restoration Program: Expand, improve, and accelerate Maryland's Oyster Restoration and Repletion Programs, and Virginia's Oyster Restoration Program in collaboration with Federal and private partners. This work would include, but not be limited to an assessment of cultch limitations and long-term solutions for this problem and the development, production, and deployment of large quantities of disease resistant strain(s) of *C. virginica* (Eastern Oyster) for broodstock enhancement.

Alternative 3 - Harvest Moratorium: Implement a temporary harvest moratorium on native oysters and an oyster industry compensation (buy-out) program in Maryland and Virginia or a

program under which displaced oystermen are offered on-water work in a restoration program.

Alternative 4 - Aquaculture: Establish and/or expand State-assisted, managed or regulated aquaculture operations in Maryland and Virginia using the native oyster species.

Alternative 5 - Aquaculture: Establish State-assisted, managed or regulated aquaculture operations in Maryland and Virginia using suitable triploid, non-native oyster species.

Alternative 6 - Introduce and Propagate an Alternative Non-Native Oyster Species (Other than *C. ariakensis*) or an Alternative Strain of *C. ariakensis*: Introduce and propagate in the State-sponsored, managed or regulated oyster restoration programs in Maryland and Virginia, a disease resistant oyster species other than *C. ariakensis*, or an alternative strain of *C. ariakensis*, from waters outside the U.S. in accordance with the ICES 1994 (2003) Code of Practices on the Introductions and Transfers of Marine Organisms.

Alternative 7 - Introduce the Asian oyster species, *C. ariakensis*, propagated from existing 3<sup>rd</sup> or later generation of the Oregon stock of this species, into the Chesapeake Bay to increase oyster populations. Discontinue, all State and Corps native oyster (*C. virginica*) restoration efforts throughout the Chesapeake Bay.

Alternative 8 - Combination of Alternatives (or portions of alternatives)

**TIMELINE/SCHEDULE OF EIS:** Presented below is a brief timeline of the EIS.

- In July 2003, the states of Maryland and Virginia requested the USACE Norfolk District's joint participation in preparing an EIS to evaluate oyster restoration alternatives for the Chesapeake Bay, including native and/or non-native oysters.
- The research, modeling and assessment frameworks to support the EIS were initiated in October 2003.
- A Notice of Intent was issued by the USACE Norfolk District on January 5, 2004.
- The report of the Scientific and Technical Advisory Committee of the Chesapeake Bay Program (STAC) entitled "Identifying and prioritizing research required to evaluate ecological risks and benefits of introducing diploid

*Crassostrea ariakensis* to restore oysters to Chesapeake Bay" was released on February 20, 2004. The report identifies specific research recommendations to address issues related to the genetics, biology and ecology of *C. ariakensis*.

- The public scoping period was conducted from January 5 to February 27, 2004.
- The scope of the EIS was defined in March 2004, based upon public scoping comments, in collaboration with the Project Delivery Team (PDT).
- In March 2004, NOAA's Chesapeake Bay Program Office initiated a research program to support the EIS.
- The roles and memberships of the Oyster EIS working groups, including the peer review process, were initiated in May 2004 and approved in the project management plan of the cost-sharing agreement on September 7, 2005.
- Final research reports are now available for several EIS-related study efforts. Several of these and other studies are continuing with NOAA funding support.
- Several modeling efforts are being, or have been, conducted to support the EIS. An oyster ecosystem impact model was completed in August 2005. A larvae transport model is scheduled to be completed in February 2006. And, a demographic oyster population model for *C. virginica* is scheduled to be completed approximately eight weeks thereafter. The timeline for completing the demographic model for *C. ariakensis* will be determined upon completing the demographic model runs for *C. virginica* and obtaining advice from the Oyster Advisory Panel.
- Preliminary results of the cultural and economic assessments were completed in July and October 2005, respectively. These assessments will be refined upon the completion of the larvae transport and demographic models and ecological risk assessment. The schedule for completing these assessments and incorporating the results into a pre-draft EIS will be determined upon completion of the demographic modeling runs.
- A June 2006 "checkpoint" has been established by the Federal and State lead agencies in collaboration with the cooperating Federal agencies for determining whether or not there is sufficient scientific information to release a draft EIS for public review. This determination will be based upon the advice from the Oyster Advisory Panel. An updated schedule for the remaining elements of the EIS will be developed at this checkpoint.
- Draft and Final EIS Schedule - To be determined.

**PEER REVIEW PLAN:** The following peer review plan was prepared to comply with the "Final Information Quality Bulletin for Peer Review" issued by the Office of Management and Budget (hereafter to as the "OMB Bulletin") on December 16, 2004. This OMB Bulletin has subsequently been incorporated into the USACE Engineering Circular No. 1105-2-408 "Peer Review of Decision Documents". The purpose of this peer review plan is to ensure that the quality of scientific information that supports findings or conclusions representing the official position of one or more agencies of the federal government meets the standards of the scientific and technical community.

The OMB Bulletin applies to "influential scientific information" and "highly influential scientific assessments". Influential scientific information is defined as scientific information that the agency can reasonably determine to have or does have a clear and substantial impact on important public policies or private sector decisions. Highly influential scientific assessment is defined as an evaluation of a body of scientific or technical knowledge, which typically synthesizes multiple factual inputs, data, models, assumptions, and/or applies best professional judgment to bridge uncertainties in the available information.

Under the OMB Bulletin, agencies are granted broad discretion to weigh the benefits and costs of using a particular peer review mechanism for a specific information product. The selection of an appropriate peer review mechanism for "influential scientific information" is left to the agency's discretion. For "highly influential scientific assessments", the OMB Bulletin requires a more rigorous peer review and stricter minimum requirements.

Even though this EIS was initiated in advance of the OMB Bulletin, the involved agencies developed peer review practices to achieve the highest levels of both scientific and process integrity. A description of the initial peer review process was included in the Project Management Plan of the signed Cost-Sharing Agreement between the co-lead Federal and State agencies. It was later determined that the scientific information and assessments supporting this EIS were applicable to the December 16, 2005 OMB Bulletin on peer review.

Modifications to the peer review process described in the Project Management Plan of the signed Cost-Sharing Agreement

were made in collaboration with the Project Delivery Team (PDT) consisting of representatives of the lead and cooperating agencies, as well as the Potomac River Fisheries Commission (PRFC) and the Atlantic States Marine Fisheries Commission (ASMFC). The involved agencies also consulted with the National Academy of Sciences, as well as scientists from the University of Maryland and Virginia Institute of Marine Sciences. The final OMB peer review plan is fully described within this document.

The peer review plan for this EIS first identifies whether or not the forthcoming scientific information is considered "influential scientific information" or "highly influential scientific assessments". The peer review plan then describes the peer review mechanism that has been established for both categories. Attachment 1 provides a diagram of the various groups, as well as components of the review process.

**FORTHCOMING SCIENTIFIC INFORMATION FOR THIS EIS:** A listing of the scientific information currently under development that will be subjected to the OMB Bulletin with regards to this EIS is included in Attachment 2. Additional scientific information may be added to the list in Attachment 2. Each scientific information product is identified as either being "influential scientific information" or "highly influential scientific assessments". An internet-accessible listing of these forthcoming scientific information products will be made available to the public and updated regularly.

**PEER REVIEW PLAN OF "INFLUENTIAL SCIENTIFIC INFORMATION":**

Results from the research projects that support the EIS will be used in the modeling and assessment projects to determine the risks and benefits associated with each alternative. Because this information may have a substantial impact on public policy decisions related to oyster restoration programs in the Chesapeake Bay, the research projects are being viewed as "influential scientific information". The research projects including but not limited to those already completed or currently underway that will be subjected to the OMB Bulletin review process are presented in Attachment 2. A significant number of additional published and unpublished data will be used to support this EIS. Much of this research was reference material to the National Research Council of the National Academy of Sciences 2003 Report "Nonnative Oysters in Chesapeake Bay", and thereby presumed not to require additional peer review

according to Section III(2) of the OMB Bulletin. Research not listed in Attachment 2 or referenced by the National Academy of Sciences, and determined to be important to the findings of this EIS will be incorporated into this peer review plan.

The Peer Review Group will provide independent peer review of individual research projects. The Scientific Advisory Committee, ASMFC Interstate Shellfish Transport Committee, Oyster Advisory Panel, Ecological Risk Assessment Team (Principal Investigators for the ecological risk assessment (University of Maryland and Versar, Inc.) and Ecological Risk Assessment Advisory Group) and Project Delivery Team will also be given opportunities to provide comments on these research projects to the lead and cooperating agencies. However, final peer review of the research projects is the responsibility of the Peer Review Group (Attachment 1, Figure 1). The membership, roles, funding sources, review criteria and review process of these working groups are included in Attachment 3.

## **PEER REVIEW PLAN OF "HIGHLY INFLUENTIAL SCIENTIFIC ASSESSMENTS"**

### **Modeling Projects:**

A modeling framework consisting of an oyster larvae transport model, oyster demographic model, and a model to evaluate the ecosystem impacts of oyster restoration (hereinafter referred to as the "oyster ecosystem impact model") will support the EIS. The modeling projects subjected to the OMB Bulletin are identified in Attachment 2.

The modeling projects are being viewed as "highly influential scientific assessments" because the output will be a primary source of information used to quantify the ecological, economic and cultural risks and benefits associated with each alternative in the EIS. This information will be the basis by which important public policy decisions will be made regarding oyster restoration programs in the Chesapeake Bay.

The objective of the oyster larvae transport model is to determine the potential distance and rate of *C. ariakensis* and *C. virginica* oyster larvae dispersal in Chesapeake Bay. The model will utilize coupled hydrodynamic and larvae transport models with links to the oyster demographic mode. The larvae transport model will be run with 1) circulation patterns from two three-dimensional (3-D) hydrodynamic models (Regional Ocean Modeling System (ROMS) and QUODDY), 2) circulation patterns from years of different physical conditions, and 3) observed



behaviors of *C. ariakensis* and *C. virginica*. Both hydrodynamic models have been successfully implemented for Chesapeake Bay, and accepted by the Bay's scientific community. No further peer review of the hydrodynamic models are planned at this time. However, peer review of *C. ariakensis* and *C. virginica* larvae behavior characteristics and application of larvae behavior data in the model will initially be peer reviewed by the Peer Review Group. Since larvae dispersal is an interdisciplinary study with knowledge of larvae biology and hydrodynamics being essential, the Peer Review Group member responsible for overseeing the review of larvae dispersal related projects will be asked to include as part of their review team individuals with expertise in larvae behavior and physical oceanography, as well as someone to assess whether the larvae dispersal dynamics have been incorporated into the model appropriately. Peer review of the larvae transport model results will be the responsibility of the Oyster Advisory Panel. The Scientific Advisory Committee, and ASMFC Interstate Shellfish Transport Committee will also be provided an opportunity to review and comment on the results from this model (Attachment 1, Figure 2). Comments received by the Peer Review Group, Scientific Advisory Committee and ASMFC Interstate Shellfish Transport Committee will be provided to the Oyster Advisory Panel. Dissenting views of the Oyster Advisory Panel will be addressed through communications with the Principal Investigators and Peer Review Group.

An oyster demographic model will be developed that can be used to predict population growth of *C. ariakensis* and *C. virginica*, both spatially and temporally, within Chesapeake Bay, for each of the oyster restoration alternatives being evaluated in this EIS. The peer review process is identical to that outlined for the larvae transport model. The Oyster Advisory Panel will have the principal responsibility for peer reviewing the demographic model. The Peer Review Group will be involved in reviewing the research findings that may provide model input data. The Scientific Advisory Committee and ASMFC Interstate Shellfish Transport Committee will also be provided an opportunity to review and comment on the demographic modeling results (Attachment 1, Figure 2).

The ecosystem impacts of oyster restoration will be quantitatively assessed using an existing oyster ecosystem impact model developed by the U.S. Army Engineer and Development Center (Vicksburg, MS). The model is a component of the Chesapeake Bay Environmental Model Package (CBEMP), which has been historically utilized as a successful management tool

employed by the Environmental Protection Agency's Chesapeake Bay Program. The CBEMP consists of a coupled system of models including a 3-D hydrodynamic model, a 3-D eutrophication model, and a sediment diagenesis model. The Chesapeake Bay Program recently reviewed and approved the use of this model to examine the impact of a 10-fold increase in the Bay's oyster population. The same version of this model is used in this EIS to examine the ecological effects of a wider range of restored oyster population levels. Therefore, no further peer review of this model is planned at this time.

The membership, roles, funding sources, review criteria and review process of the groups involved in peer reviewing the modeling projects are included in Attachment 3.

**Assessment Projects:**

Cultural analysis, economic analysis and an ecological risk assessment will also be used to identify the risks and benefits for the range of alternatives being evaluated in this EIS. These assessment projects are also being viewed as "highly influential scientific assessments". The assessment projects subjected to the OMB Bulletin are identified in Attachment 2.

Peer review of the above-referenced assessment projects will be accomplished using a team of reviewers in each of the respective fields of interest consistent with the peer review guidelines established for the Peer Review Group, as well as the Office of Management and Budget's stricter minimum requirements for the peer review of highly influential scientific assessments. (Attachment 3).

A lead person with expertise in the field of environmental anthropology will be identified to lead and coordinate the peer review of the cultural analysis consistent with the guidelines established for the Peer Review Group (Attachment 3).

Dr. James Anderson (University of Rhode Island) will lead and coordinate the peer review of the economic analysis consistent with the guidelines established for the Peer Review Group (Attachment 3). Dr. Anderson currently serves as a member of the Oyster Advisory Panel, and previously served as the co-chair of the National Academy of Sciences National Research Council's Report "Nonnative Oysters in the Chesapeake Bay".

The Ecological Risk Assessment Group whose members include risk assessment specialists from each of the lead and cooperating Federal agencies will be the principal group

responsible for peer reviewing the ecological risk assessment (Attachment 3).

The ASMFC Interstate Shellfish Transport Committee and Oyster Advisory Panel are also responsible for providing scientific and advisory support to the lead and cooperating agencies for the cultural analysis, economic analysis and ecological risk assessment (Attachment 1, Figure 3). The membership, roles, funding sources, review criteria and review process of these working groups are included in Attachment 3.

#### **PEER REVIEW OF EIS**

Circular No. 1105-2-408, issued by the U.S. Army Corps of Engineers (USACE) on May 31, 2005, in response to the OMB Peer Review Guidelines, states that, "In general, peer reviews will focus on technical appendixes rather than solely main reports or National Environmental Protection Act (NEPA) documents (including environmental assessments and environmental impact statements). However, the USACE's FY2004 Congressional Authorization stipulates *"...That during preparation of the environmental impact statement, the Secretary may establish a scientific advisory body consisting of the Virginia Institute of Marine Sciences, the University of Maryland, and other appropriate research institutions to review the sufficiency of the environmental impact statement..."*, and recognizing that the results of this EIS will have substantial impacts on major public policy decisions that are highly controversial, an Oyster Advisory Panel was established in November 2004 to review the sufficiency of the EIS. Specifically, the Panel's charge includes:

- 1) Review the adequacy of data and assessments used to identify the ecological, economic, and cultural risks and benefits, and associated uncertainties for each EIS alternative;
- 2) Provide advice on the degree of risk that would be involved for each EIS alternative if a decision were made in 2005 based on the available data and assessments; and
- 3) Recommend additional research, and associated timeline, that could be obtained to reduce the level of risk and uncertainty.

Panel members were selected with an emphasis on expertise and balance, with a focus on their abilities to avoid conflicts of interest to the fullest extent possible. The seven members selected to this Panel include:

- Brian J. Rothschild, Ph.D., (Chairperson) Dean, Intercampus Graduate School of Marine Sciences and Technology, University of Massachusetts, Director, School for Marine Science and Technology
- James Anderson, Professor, Marine Resource Economics, Department of Environment and Natural Resource Economics, University of Rhode Island
- Maurice Heral, General Scientific Director of French Research Institute for Exploitation of the Sea IFREMER
- Eric Powell, Director of the Haskin Shellfish Research Laboratory, Institute for Marine and Coastal Sciences, Rutgers University
- Mike Roman, Professor and Director, Horn Point Laboratory, University of Maryland Center for Environmental Science
- Roger L. Mann, Professor of Marine Science, Virginia Institute of Marine Science
- Mark Berrigan, Chief of the Bureau of Aquaculture Development, Division of Aquaculture, Florida Department of Agriculture and Consumer Services

Drs. Berrigan and Anderson were members of the National Research Council of the National Academy of Sciences (NAS), Committee on Nonnative Oysters in the Chesapeake Bay; Anderson was Co-Chair of that Committee. They were included on the panel to provide the continuity of the NRC recommendations along with the independent review by other members of the panel.

Significant efforts were made to avoid real or perceived conflicts of interest. However, this was unavoidable given the magnitude and breadth of researchers and education institutions involved in this project. The agencies and stakeholders involved in this EIS have expressed high regards for the capability, intellectual capacity and expertise of the individual's composing this panel's membership. However, concern has been expressed over a potential conflict of interest for Dr. Mike Roman and Dr. Roger Mann who currently supervise a number of the scientists involved in EIS-related research, modeling and assessment projects. In addition, Dr. Mann is a lead Principal Investigator for one research project.

The OMB Peer Review Guidelines refers to the NAS policy on committee composition and balance. NAS defines "conflict of

interest" as any financial or other interest which conflicts with the service of the individual because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.

NAS also has specifications regarding the potential for conflicts of interests for employees of sponsors: An individual who is employed by the agency or other entity which is sponsoring the study or a component thereof, ordinarily cannot be a member of the peer review committee for that study. This stipulation is due to the fact that the individual's objectivity may be compromised when asked to critique independent reports and other services generated by the institution. However, in special circumstances, and to the extent not prohibited by federal or state law or regulations, such an individual may serve as a member of such a committee where the following requirements are met: (1) the service of the individual on the committee must be based upon the unique scientific or technical expertise which the individual brings to the committee; (2) the individual must not be involved in any way within the agency in any deliberative or decision-making process or any policy-making or similar process relating to the study or other activity or the expected or intended results of the study or other activity; and (3) it must be specifically determined during the committee appointment process that service by the individual will not compromise, or appear to compromise, the independence or objectivity of the particular study or other activity in which the committee is engaged.

Upon review of the NAS policy of committee composition and balance, and the above referenced conflict of interest concern, it is the opinion of the lead agencies involved in this EIS that the inclusion of Dr. Roman and Dr. Mann is acceptable. This determination was made based on the unique scientific and technical expertise that these individuals bring to the panel. Dr. Roman and Dr. Mann have both earned their positions as Director's of marine research laboratories within the State of Maryland and Commonwealth of Virginia because of their ability to provide independent scientific advice. This decision was also made based upon the Congressional authorization for this project which recommended that the scientific advisory body established for reviewing the sufficiency of this EIS include representation from the University of Maryland and Virginia Institute of Marine Sciences. Whether this expressed conflict of interest concern is real or perceived, the agency will

publicly disclose this information to improve the transparency of this peer review process.